Amendment to Claims

This listing of Claims will replace all prior versions and listings of claims in this Application.

Listing of Claims

Claim 1. (CURRENTLY AMENDED) A method of fabricating a ferroelectric thin film on an iridium-composite electrode in an integrated circuit device, comprising:

preparing a substrate;

depositing an iridium-composite bottom electrode on the substrate;

annealing the iridium-composite bottom electrode in a first annealing step;

depositing a buffer layer on the iridium-composite bottom electrode;

annealing the buffer layer in a second annealing step;

depositing a ferroelectric layer on the buffer layer;

annealing the ferroelectric layer in a third annealing step; and

completing the integrated circuit device.

Claim 2. (CURRENTLY AMENDED) The method of claim 1 wherein the iridium-composite bottom electrode is deposited by co-sputtering iridium and tantalum targets in an argon and oxygen ambient atmosphere.

Claim 3. (CURRENTLY AMENDED) The method of claim 1 wherein said first annealing step includes oxygen annealing of the iridium-composite bottom electrode at between about 600°C to 800°C for between about five minutes to one hour.

Claim 4. (ORIGINAL) The method of claim 1 wherein said depositing a buffer layer includes depositing a layer of material taken from the group of materials consisting of HfO_2, ZrO_2, TiO_2, LaO_x, La-Al-O, Ti-Al-O, Hf-Al-O, Zr-Al-O, Hf-Zr-O , Zr-Ti-O, Hf-Ti-O, La-Zr-O, La-Hf-O, and La-Ti-O.

Claim 5. (ORIGINAL) The method of claim 4 wherein said deposing a layer of buffer material includes depositing a layer of buffer material to a thickness of between about 3 nm to 30 nm.

Claim 6. (ORIGINAL) The method of claim 4 wherein said depositing a layer of buffer material includes depositing by a technique taken from the group of techniques consisting of physical vapor deposition, sputtering, e-beam evaporation, CVD, PECVD and ALCVD.

Claim 7. (ORIGINAL) The method of claim 1 wherein said second annealing step includes annealing in an oxygen ambient 20 is performed at between about 400°C to 800°C for between about one minute to one hour.

Claim 8. (ORIGINAL) The method of claim 1 wherein said depositing a layer of ferroelectric material includes depositing a layer of $Bi_4Ti_3O_{12}$ to a thickness of between about 20 nm to 500 nm.

Claim 9. (ORIGINAL) The method of claim 1 wherein said third annealing step annealing

in an oxygen ambient atmosphere at between about 600°C to 800°C for between about five minutes to twelve hours.

Claim 10. (CURRENTLY AMENDED) A method of fabricating a ferroelectric thin film on an iridium-composite electrode in an integrated circuit device, comprising:

preparing a substrate;

depositing an iridium-composite bottom electrode on the substrate;

annealing the iridium-composite bottom electrode in a first annealing step;

depositing a buffer layer on the iridium-composite bottom electrode, including depositing a layer of material taken from the group of materials consisting of HfO_2, ZrO_2, TiO_2, LaO_x, La-Al-O, Ti-Al-O, Hf-Al-O, Zr-Al-O, Hf-Zr-O , Zr-Ti-O, Hf-Ti-O, La-Zr-O, La-Hf-O, and La-Ti-O;

annealing the buffer layer in a second annealing step;

depositing a ferroelectric layer of $Bi_4Ti_3O_{12}$, to a thickness of between about 20 nm to 500 nm, on the buffer layer;

annealing the ferroelectric layer in a third annealing step; and

completing the integrated circuit device.

Claim 11. (CURRENTLY AMENDED) The method of claim 10 wherein the iridium-composite bottom electrode is deposited by co-sputtering iridium and tantalum targets in an argon and oxygen ambient atmosphere.

Claim 12. (CURRENTLY AMENDED) The method of claim 10 wherein said first annealing step includes oxygen annealing of the iridium-composite bottom electrode at between about 600°C to 800°C for between about five minutes to one hour.

Claim 13. (ORIGINAL) The method of claim 10 wherein said deposing a layer of buffer material includes depositing a layer of buffer material to a thickness of between about 3 nm to 30 nm.

Claim 14. (ORIGINAL) The method of claim 10 wherein said depositing a layer of buffer material includes depositing by a technique taken from the group of techniques consisting of physical vapor deposition, sputtering, e-beam evaporation, CVD, PECVD and ALCVD.

Claim 15. (ORIGINAL) The method of claim 10 wherein said second annealing step includes annealing in an oxygen ambient 20 is performed at between about 400°C to 800°C for between about one minute to one hour.

Claim 16. (ORIGINAL) The method of claim 10 wherein said third annealing step annealing in an oxygen ambient atmosphere at between about 600°C to 800°C for between about five minutes to twelve hours.